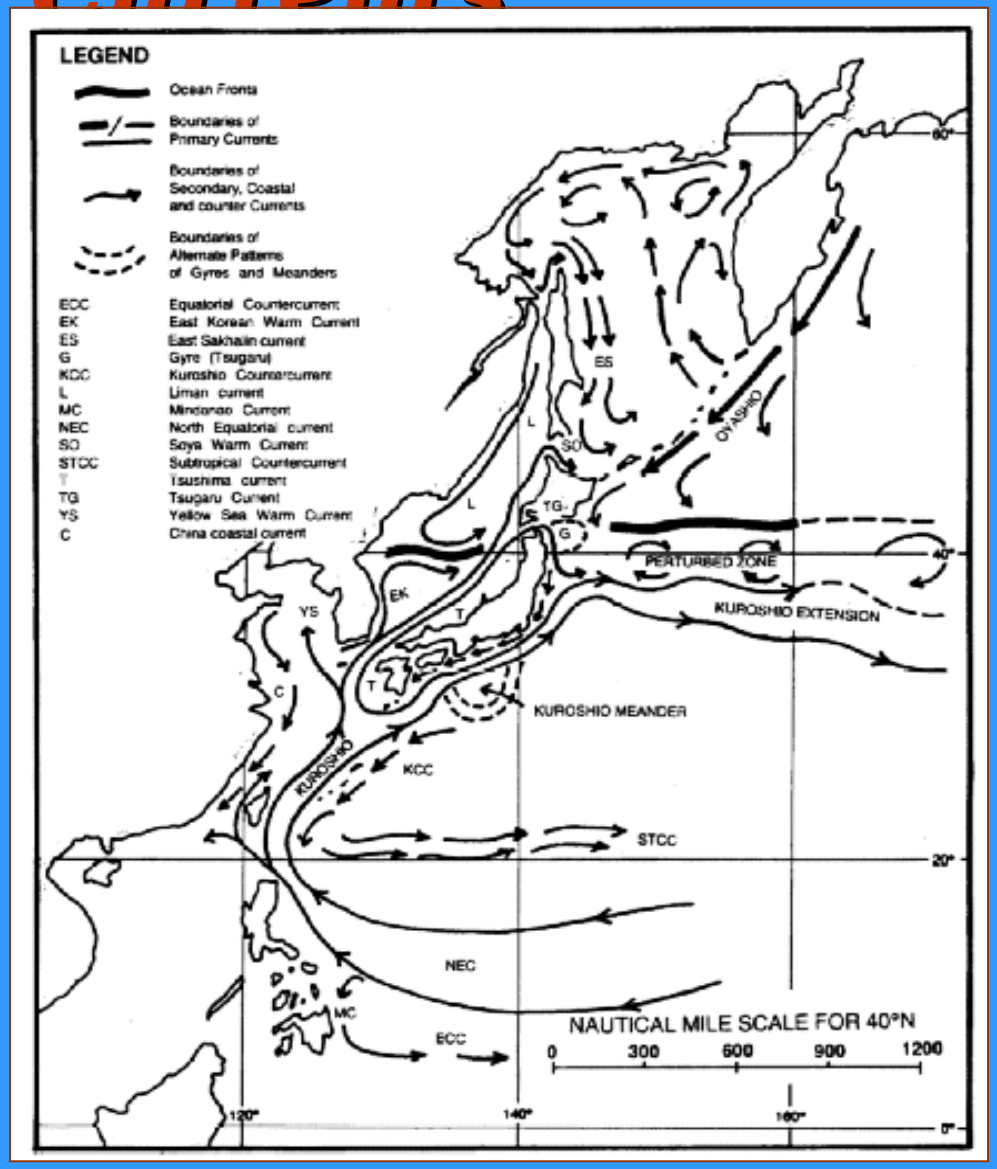
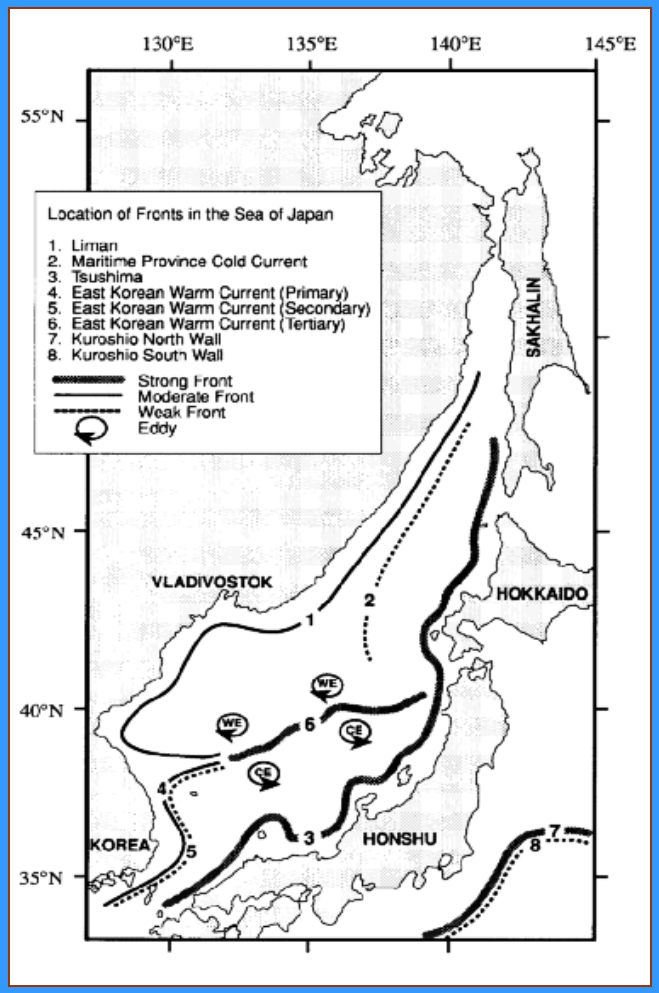
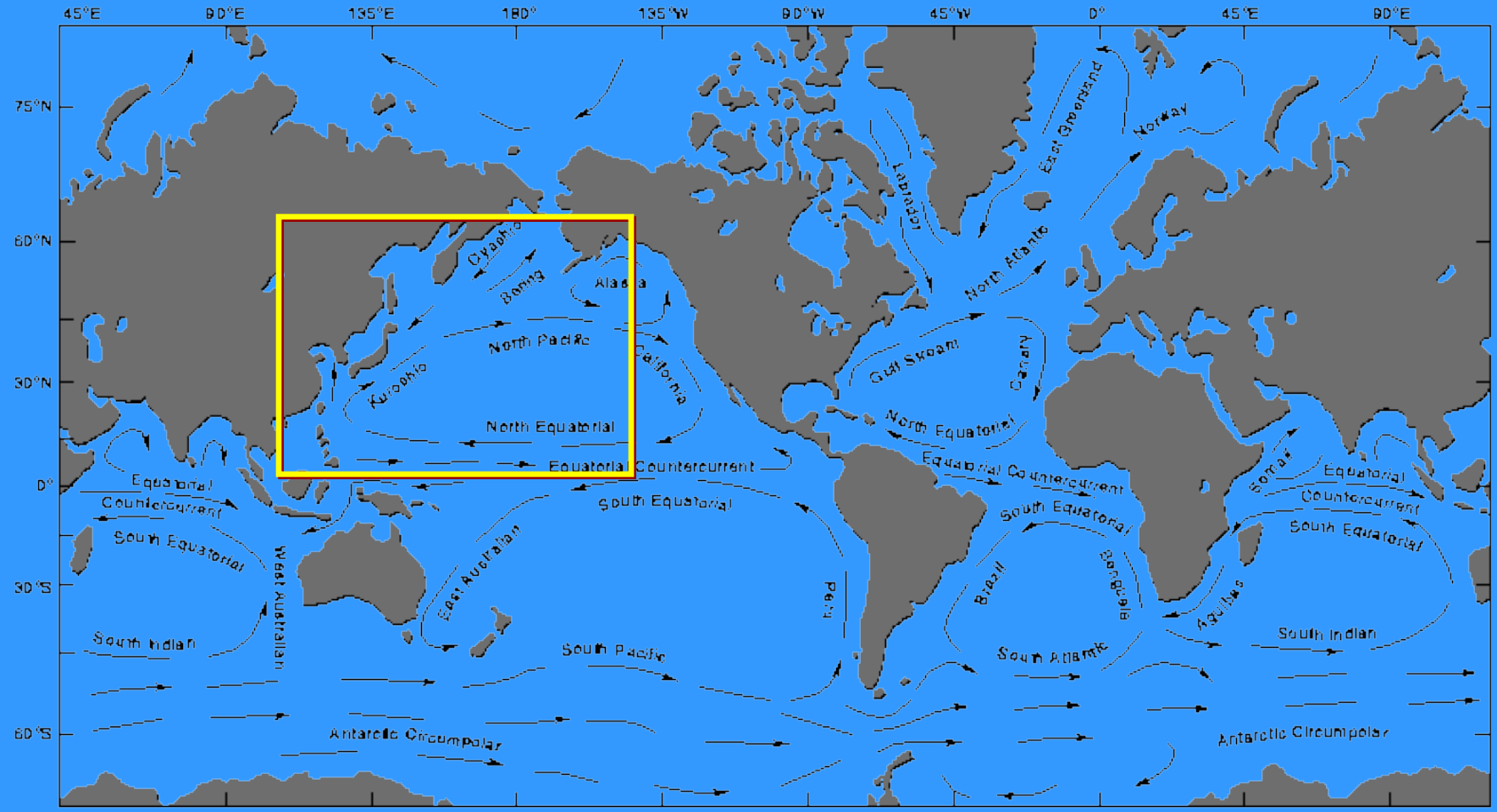
Pacific Ocean Currents





Pacific Ocean Currents



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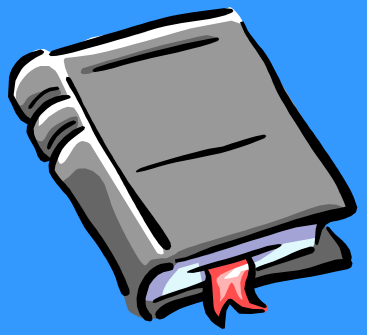
- www.7300.nrlssc.navy.mil
- www.yoko.npmoc.navy.mil
- www-ocean.tamu.edu

Definitions



- ***Ocean***
  - A body of saline water found occupying all or part of the Earth's ocean basins There are six recognized oceans: **North Atlantic**, **South Atlantic**, **North Pacific**, **South Pacific**, **Indian**, and **Arctic**.

- ***Ocean Current***
  - Large scale horizontal flow of ocean water that is persistent and driven by atmospheric circulation

- ***Gyre***
  - Arrangement of surface ocean currents into a large macro-scale circular pattern of flow.

Pacific Ocean Currents

East Sakhalin Current

Liman

North Korea

Mid-Japan Sea Cold Currents

Soya Current

Oyashio

Tsugaru Current

Perturbed Area (Northwest Pacific

Sea of Japan Oceanic Polar Front

East Korea Current

Yellow Sea Current

Tsushima Current

China Coastal Current

Kuroshio

Kuroshio Extension

Kuroshio/Subtropical Counter

South China Sea Currents

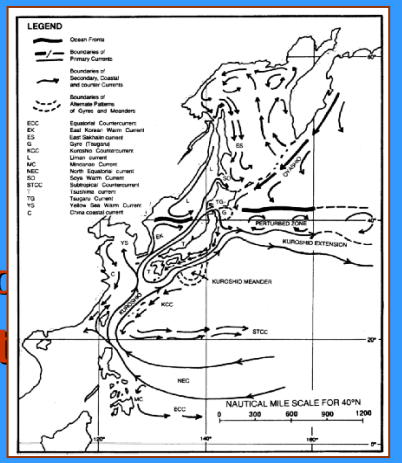
North Equatorial

Mindanao Current

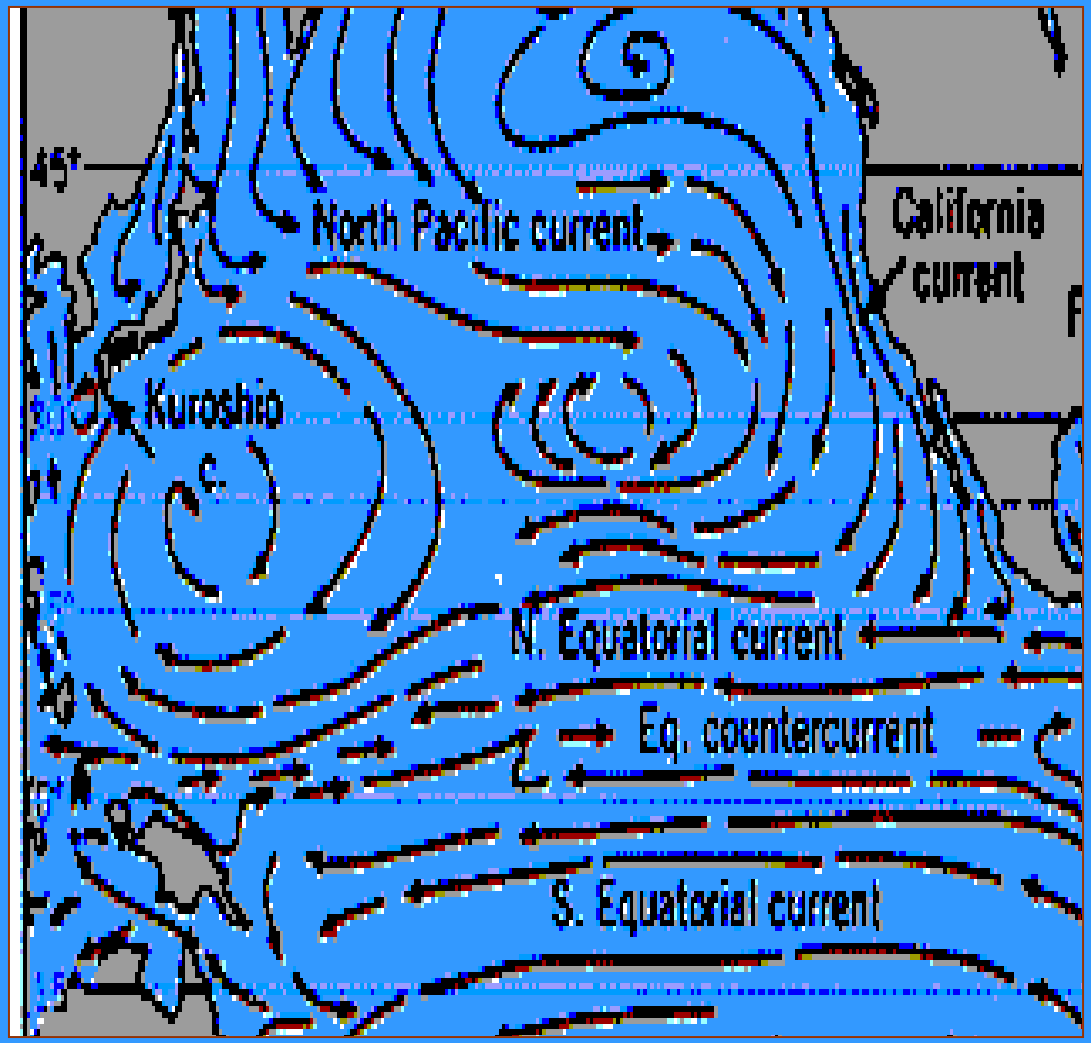
Sulawesi (Celebes) Sea Currents

Sulu Sea Currents

Equatorial Countercurrent



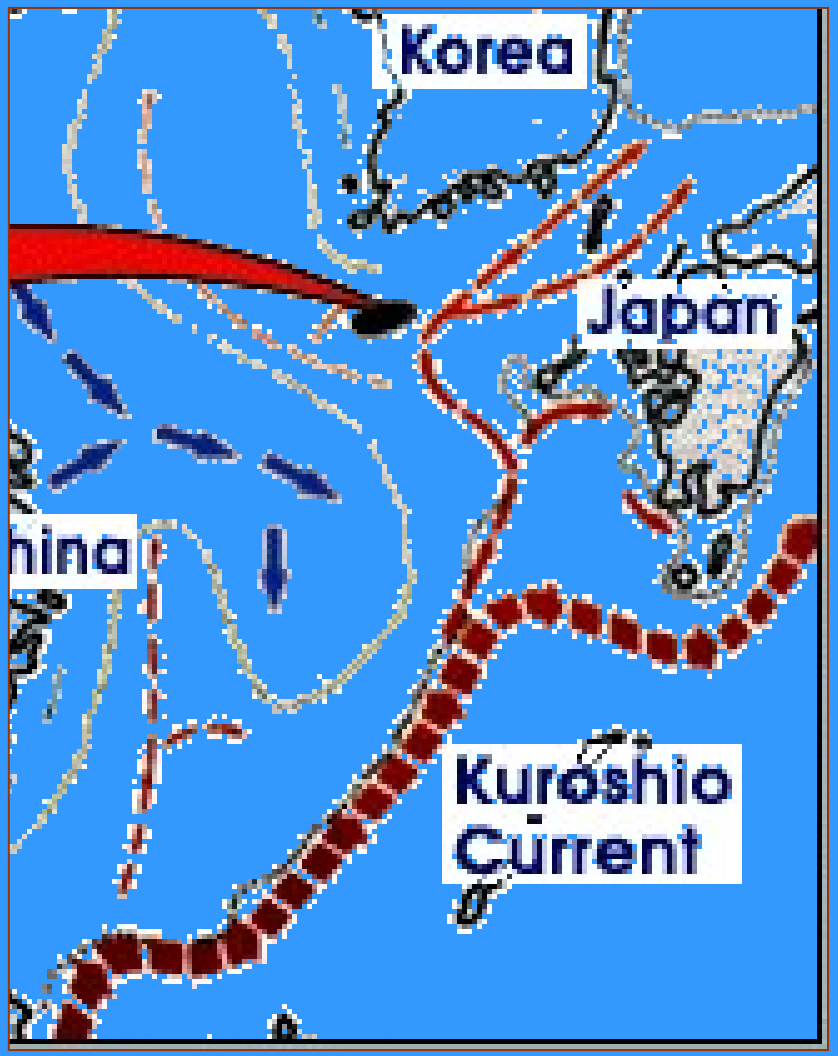
North Equatorial Current



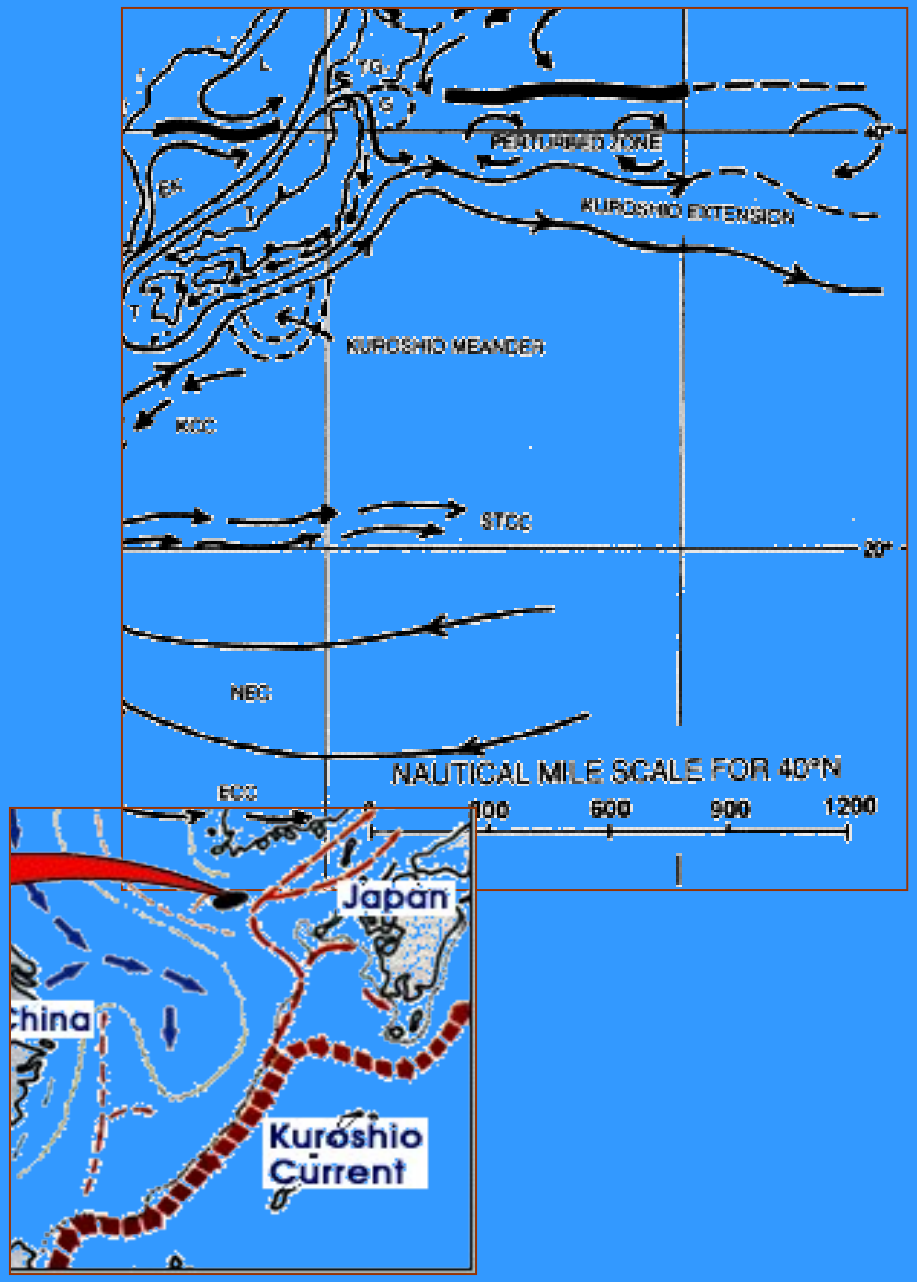
- It begins off the coast of Central America, traversing the Pacific in an east-west set in response to the trade winds
- The trade winds dictate the strength and speed of the current
- The current is a critical factor in the transportation of northern waters to southern regions
- Speed is 0.5 - 2 kts

Kuroshio Current

- Kuroshio (Black Stream) Current dominates the western pacific and is very similar to the Gulf Stream of the Atlantic
- It begins east of northern Luzon before flowing into the East China Sea northeast of Taiwan, then follows the Okinawa trough
- It splits into two parts with the major branch flowing south of Japan and the minor branch through the Korea and Tsushima Straits as the Tsushima Current
- The current advances at 2 - 5 kts



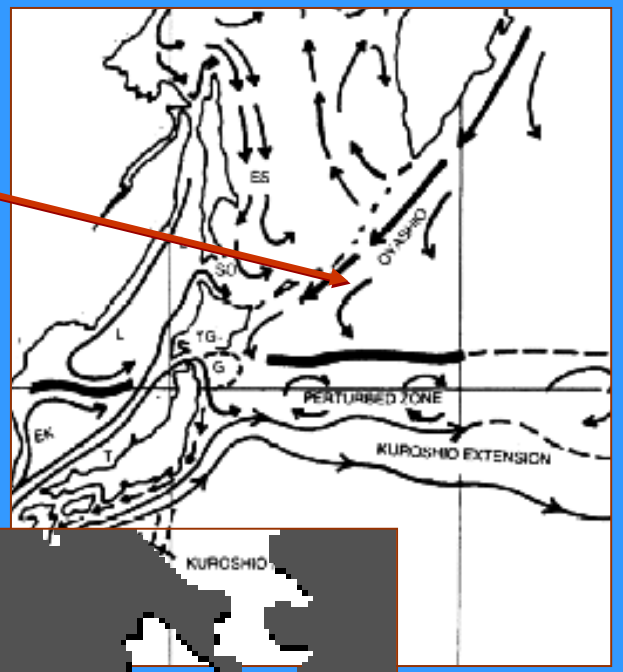
Kuroshio Extension

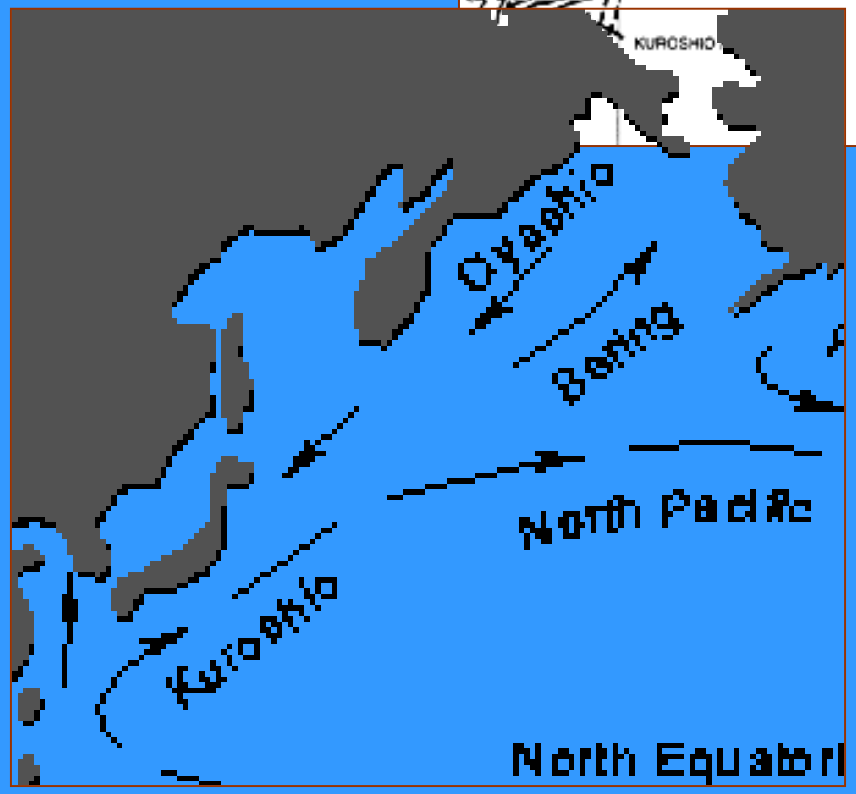


- A continuation of the Kuroshio Current extending eastward from coastal Japan near 140 E to 160 E and meandering between 35 N and 38 N
- The meandering flow forms the transition zone between cold waters north and subtropical waters south

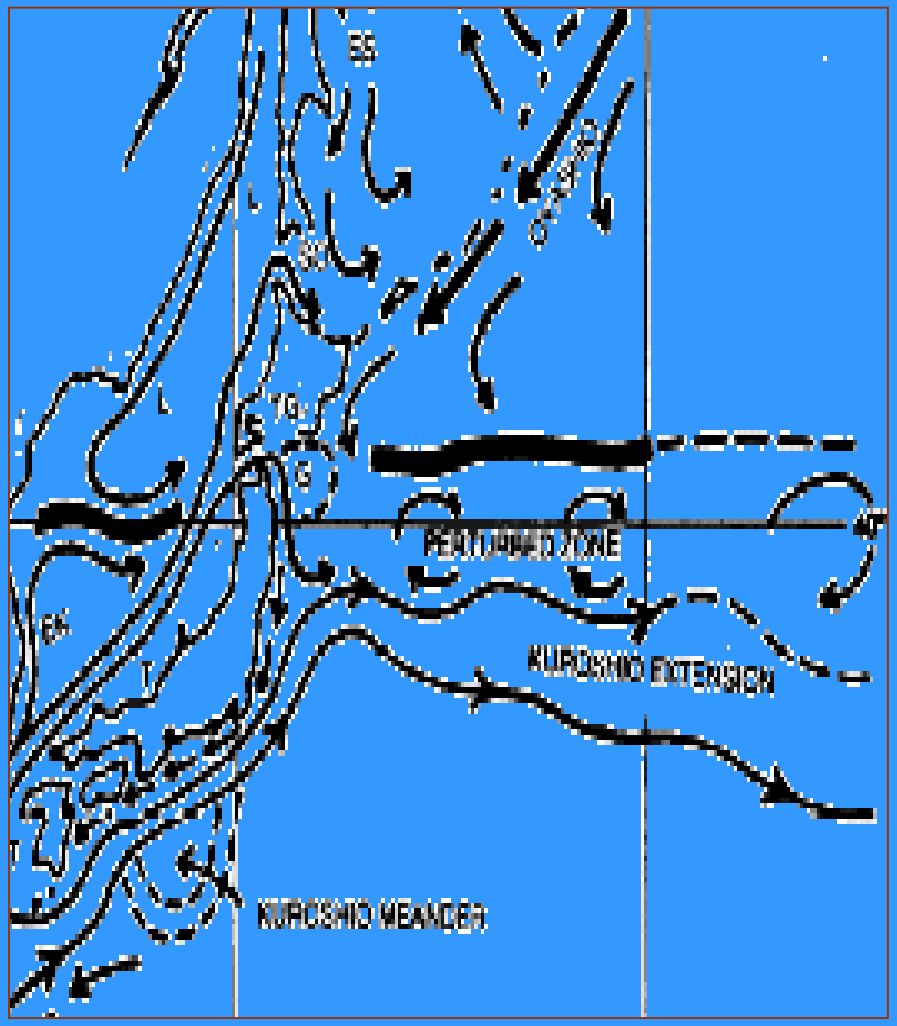
Oyashio Current

- Originates in the Bering Sea and flows southwest off Kamchatka Peninsula and the Kuril Islands
- The current then flows along the east coasts of Hokkaido and Honshu before curving east to parallel the Kuroshio Current
- It gradually merges with the Kuroshio Extension beyond 160 E





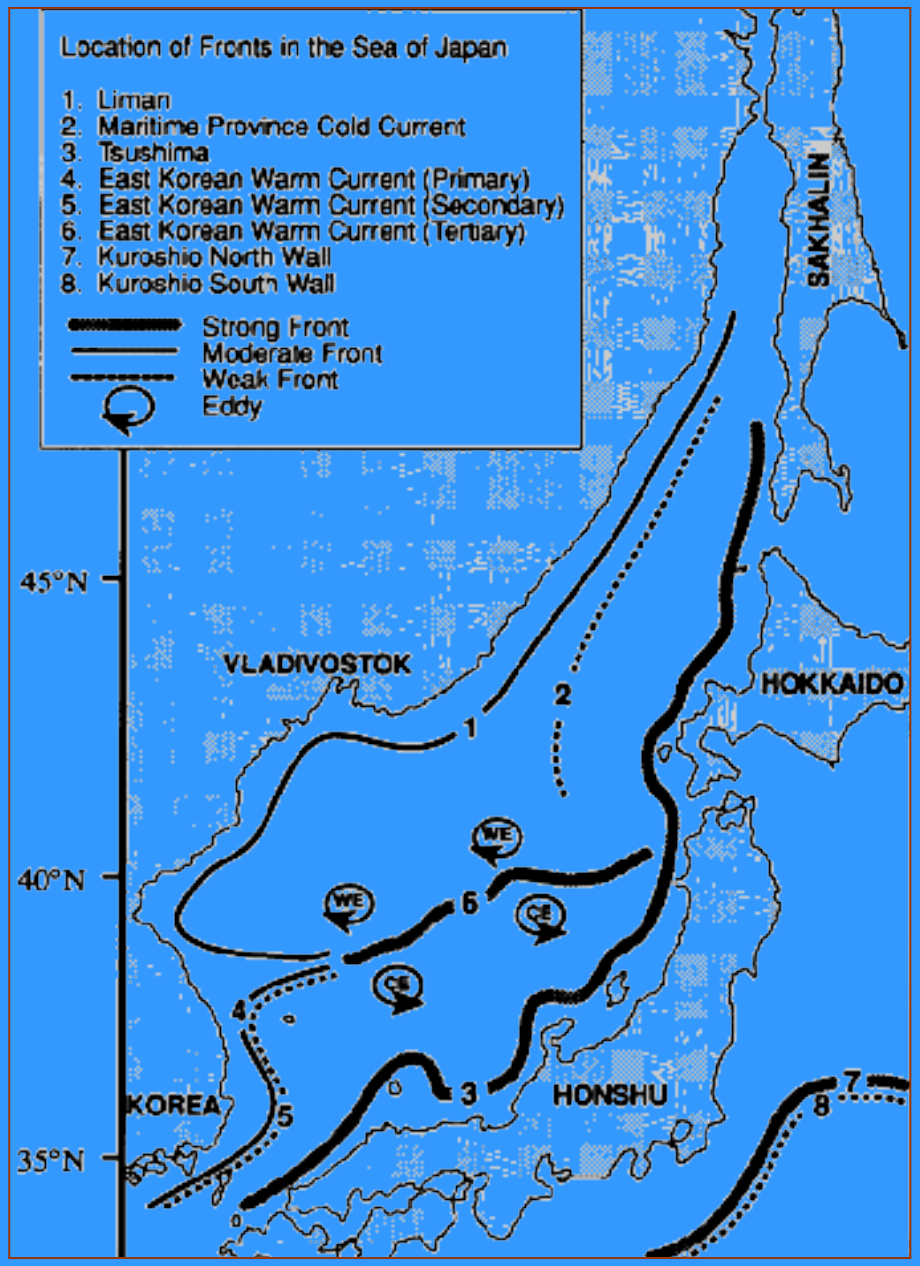
Perturbed Zone



- Bounded between the warm Kuroshio Extension and the cold Oyashio Current
- Roughly 200 - 300 nm wide and extends well beyond 160 E
- This boundary area is typically composed of a series of eddies and meanders
- Warm eddies, 80 nm in diameter or larger, tend to be stationary and short-lived
- Those eddies 150 nm in diameter will have a lifetime of at least one year
- The larger eddies form when northward meanders of the Kuroshio break off from the main current just off the eastern coast of Honshu

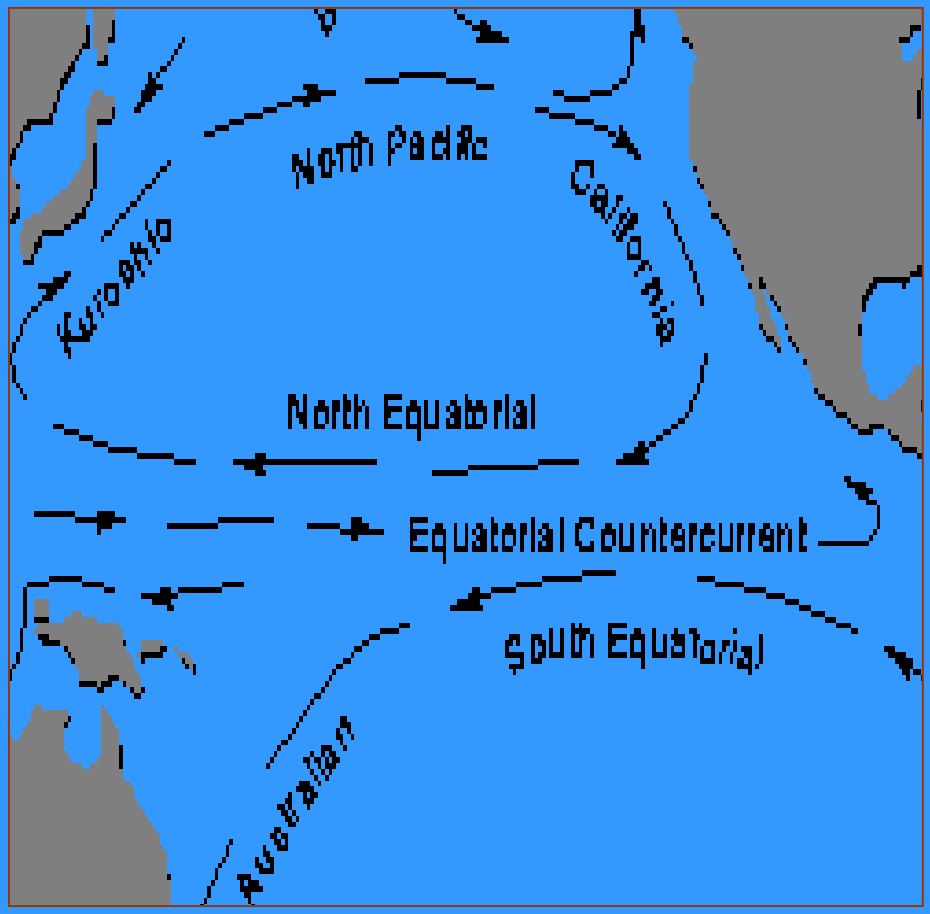
Sea of Japan Oceanic Polar Front

- The Sea of Japan is divided in two sections based on currents
- The warm sector on the Japan side and a cold sector on the Korean and Siberian Side
- The warm sector is comprised of the Tsushima Current (3) and its extension, the warm east Korea (4 - 6), Tsugaru and Soya Currents
- The cold sector consists of the Liman (1), North Korea and Mid-Japan Sea cold currents
- Persistent, year- round oceanic “Polar Front” along 38 - 40 N separates the two sectors

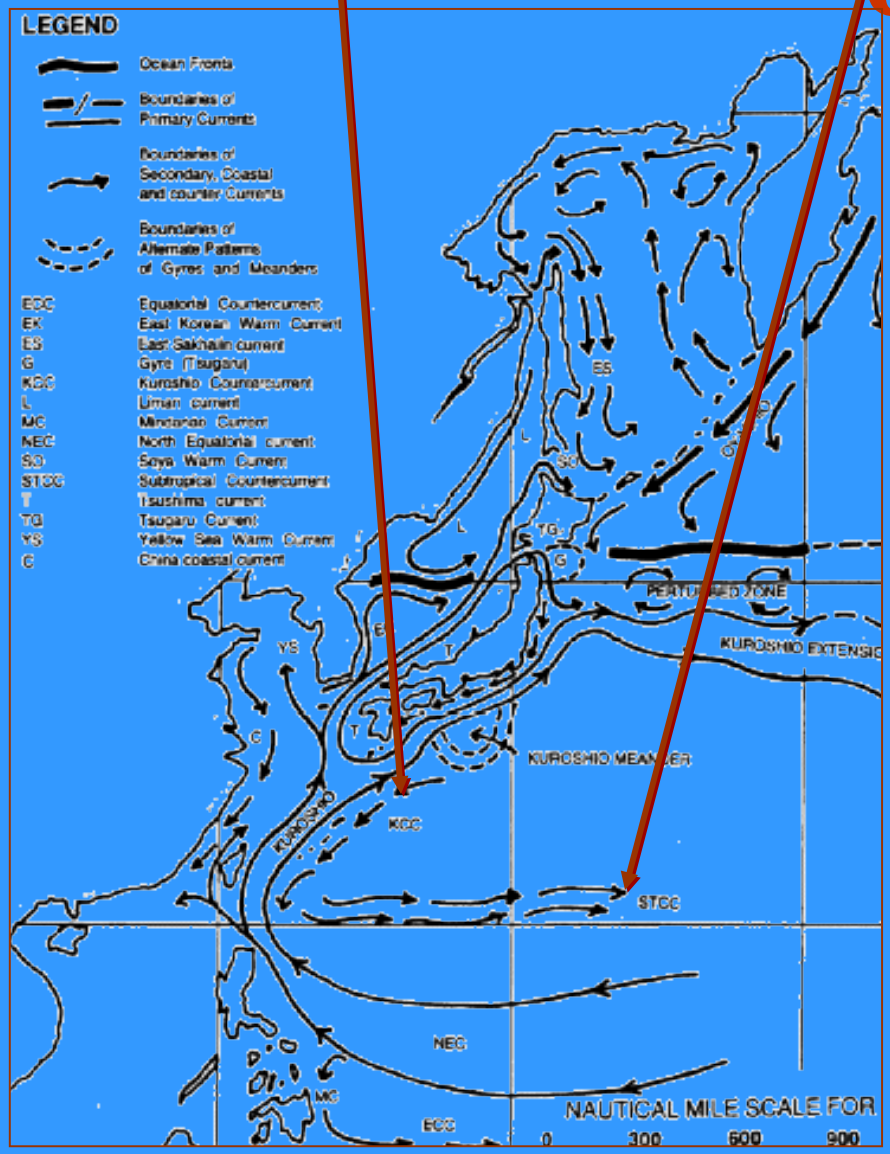


Equatorial Countercurrent

- A west to east flowing current related to the region of low wind speeds located between the northeast and southeast trades
- Originates along the coast of the Philippines, moving east to the American coast
- Present year round, it lies just to the north of the equator in the winter and migrates north with shifting weather patterns of the summer
- Speeds of up to 2 kts have been reported

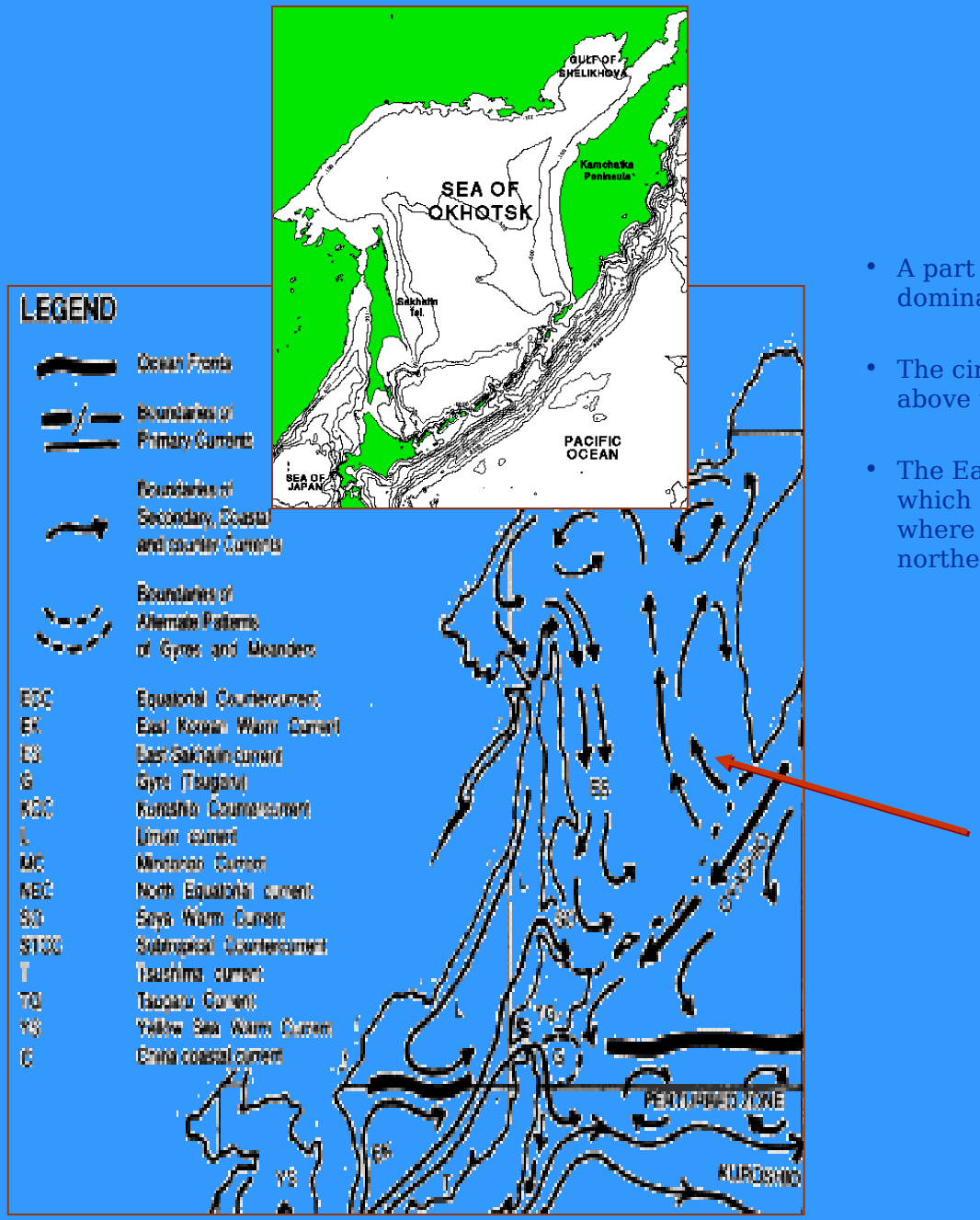


Kuroshio/Subtropical Countercurrent



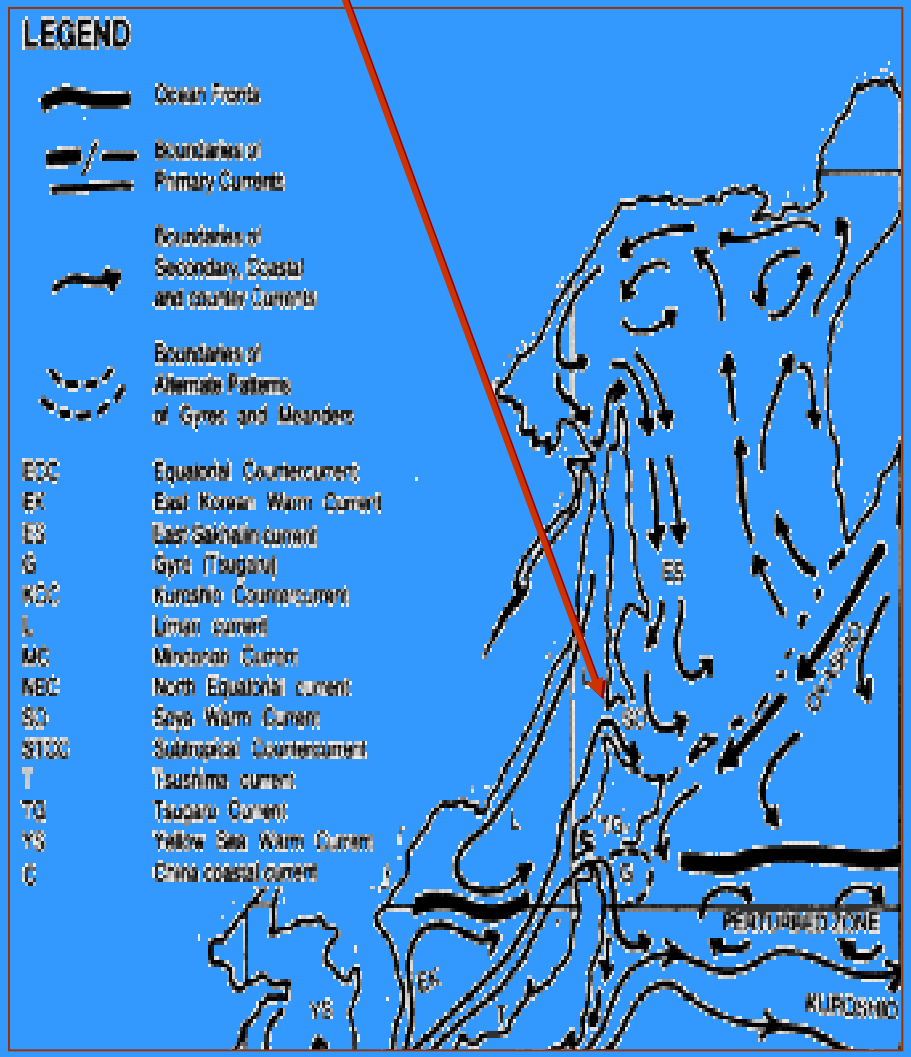
- The Kuroshio Countercurrent (KCC) flows north to south along the eastern edge of the Kuroshio moving large amounts of water south
- The movement of water is dependent on the strength of the Kuroshio meander
- The Subtropical Countercurrent (STCC) connects with the Kuroshio Countercurrent and is located between 20 N to 24 N
- The STCC persists year round but is best defined in the winter

East Sakhalin Current



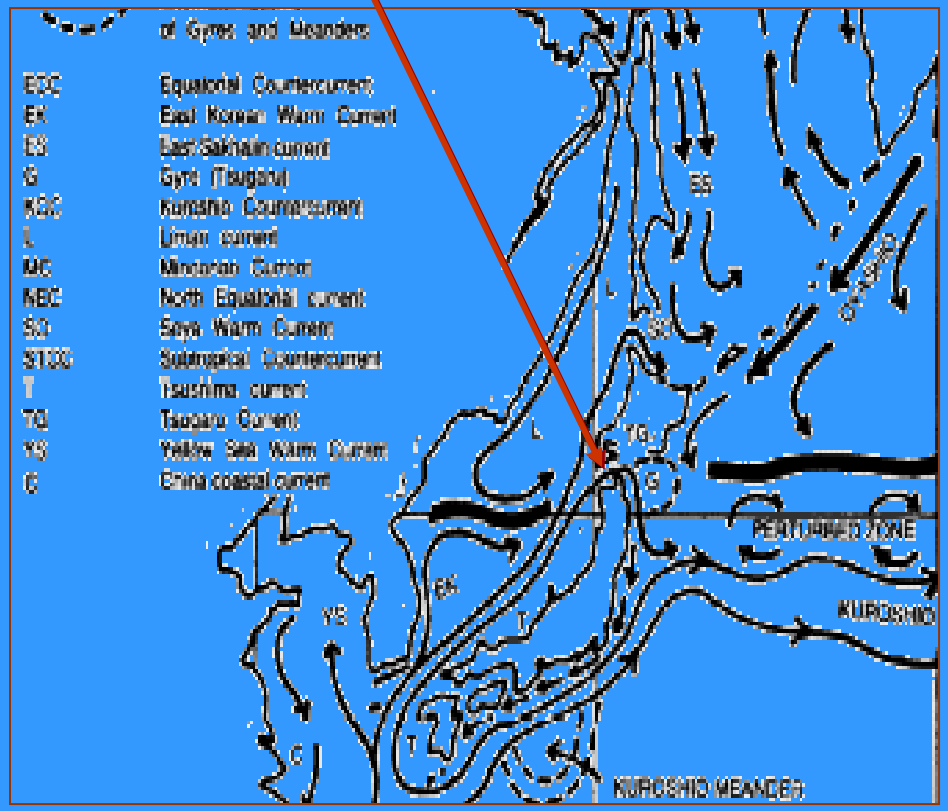
- A part of the cyclonic circulation (Okhotsk Gyre) flow that dominates the Sea of Okhotsk
- The circulation connects with the atmospheric circulation above the Sea of Okhotsk and the Western Pacific
- The East Sakhalin current is a narrow nearshore current which begins in the southeast basin near Kamchatka where water is forced from the Pacific through the northern Kuril Island Straits

Soya Current



- This current flows through the LePerouse (Soya) Strait which separates Hokkaido and Sakhalin.
- Complex topography and an extended shelf (depths less than 650 ft/198 m) result in large fluctuations in volume, speed, and direction of the warm current flowing into the strait
- Upon exiting the strait, the Soya Current turns south along the coast of Hokkaido

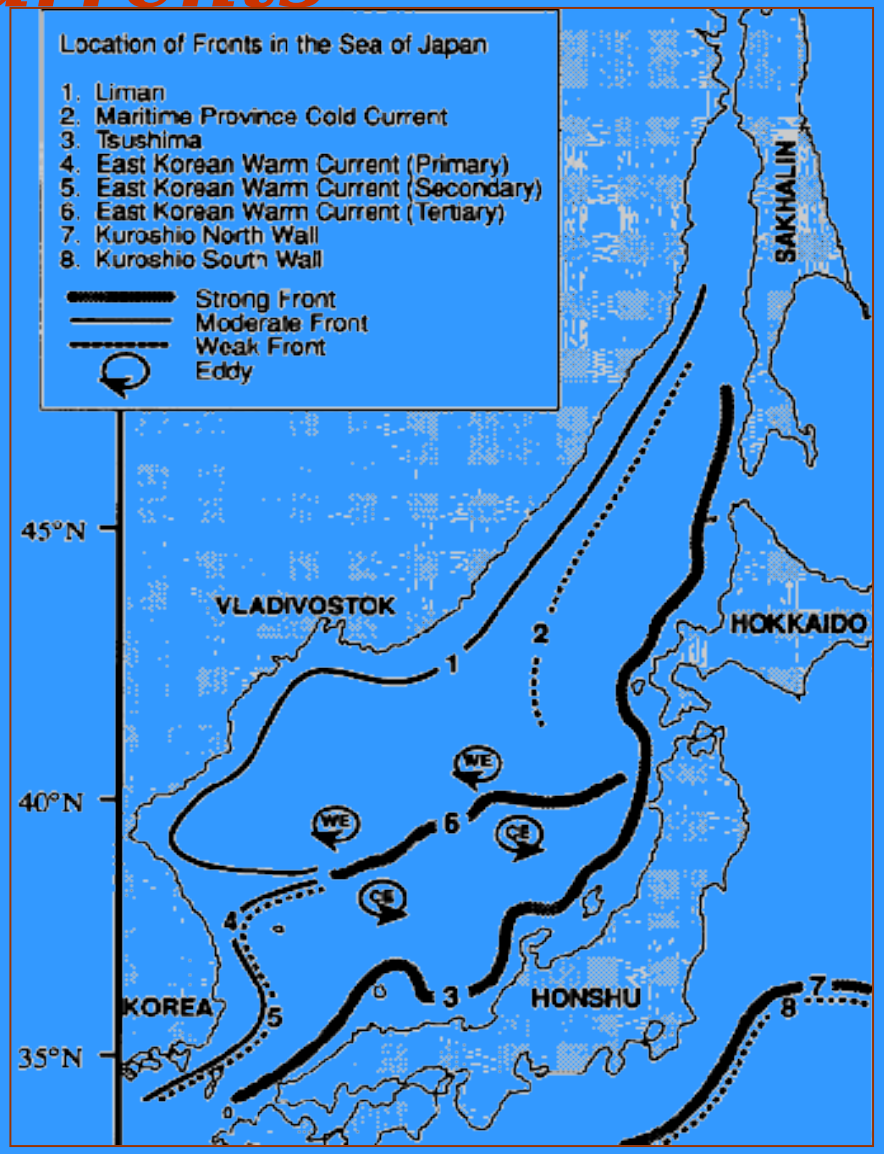
Tsugaru Current



- An extension of the Tsushima Current
- Due to island topography and shallow depths (425 ft/130 m), the current through the channel forms a core approximately 11nm wide
- Either side of the core are eddies which become trapped due to topography
- Current speeds achieve 4.5 - 5.5 kts during the summer and winter

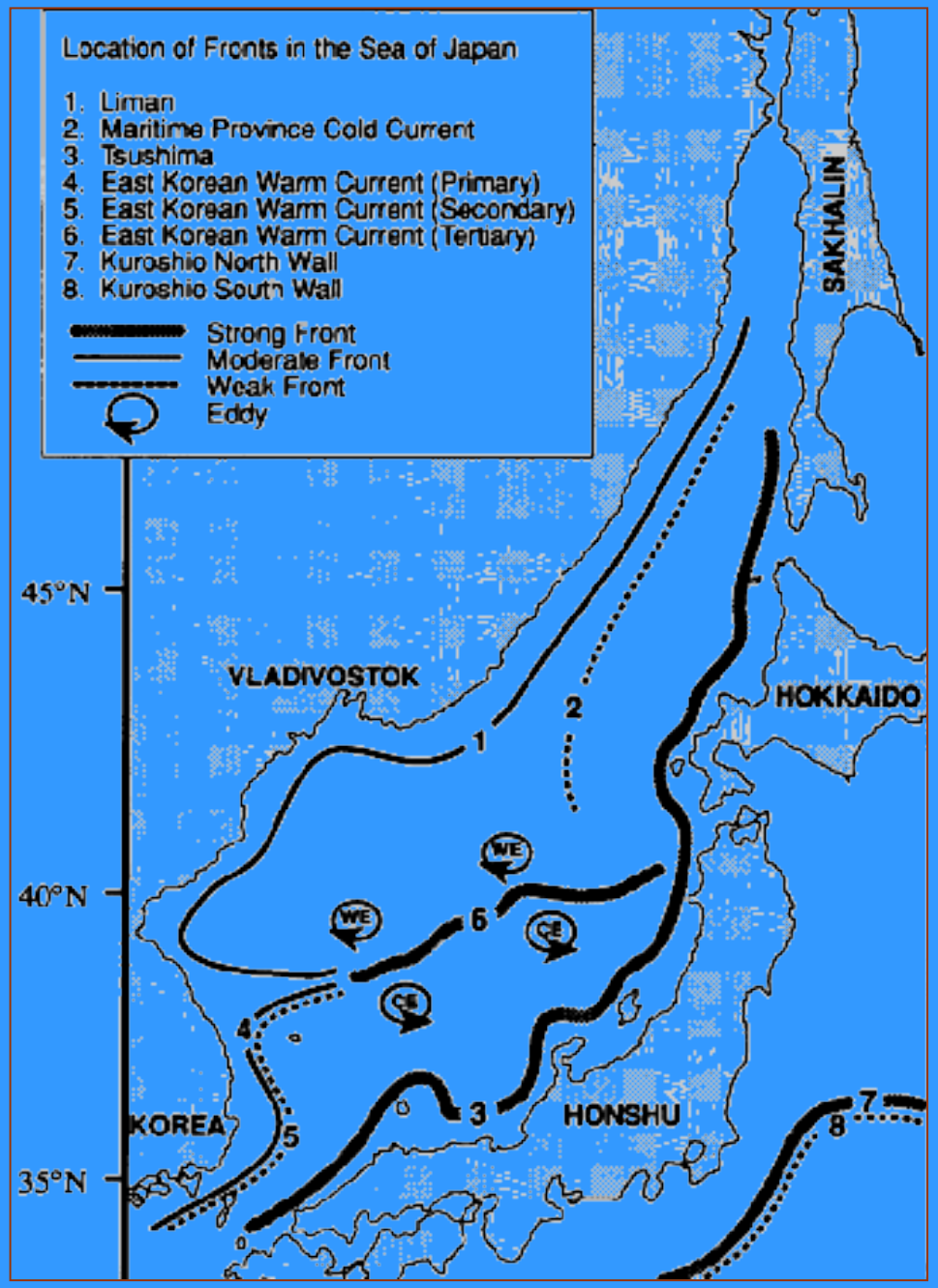
Liman, North Korea, Mid-Japan Sea Cold Currents

- The cold sector of the Sea of Japan is comprised of three cold currents:
- Liman Current (1) which flows along the Siberian Coast
- North Korean Current (1) from Vladivostok to the central east Korean coast
- Mid-Japan Sea Cold Current (1) which flows east into the central portion of the Sea of Japan



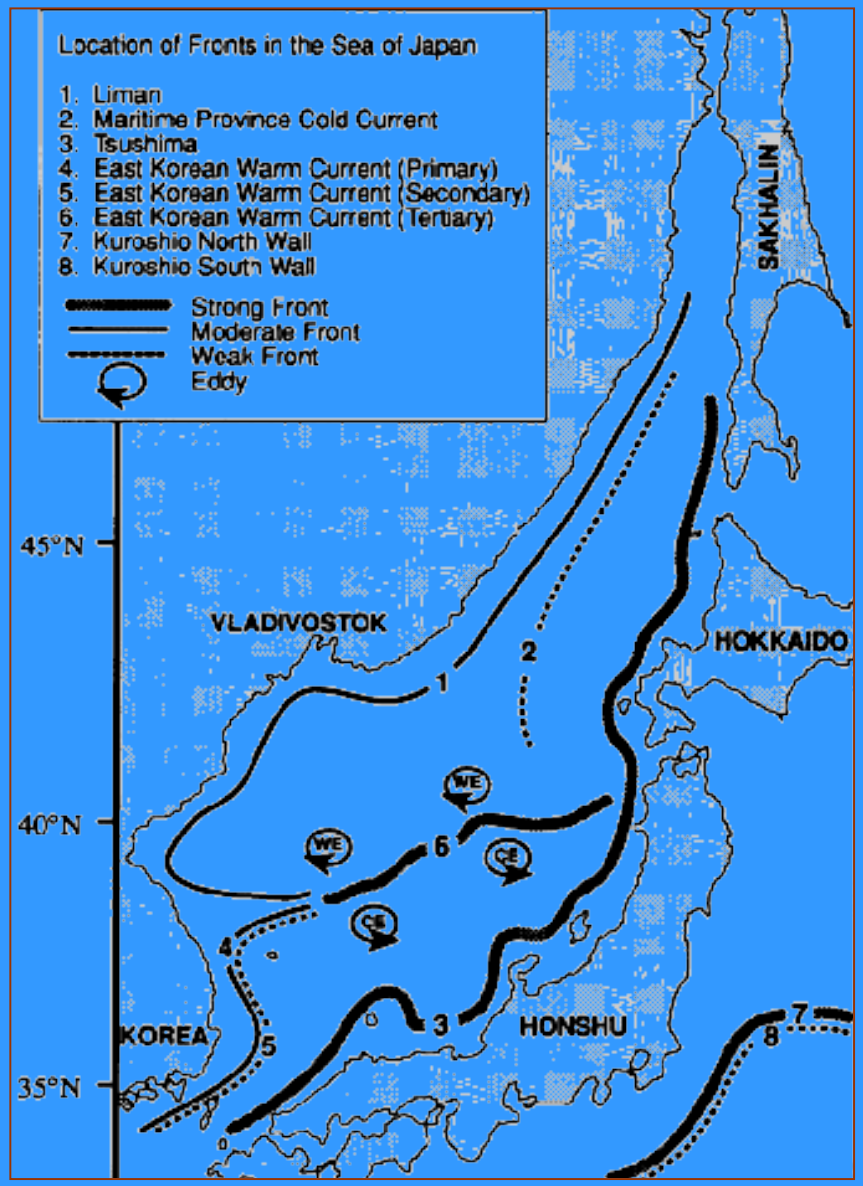
Tsushima Current

- A warm current that branches off the left side of the Kuroshio, flowing through eastern East China Sea and then entering the Sea of Japan through the Tsushima Strait
- This current is the source of all warm currents within the Sea of Japan
- Tsugaru and Soya warm currents are the north extension of the Tsushima as it flows out of the Sea of Japan through the Tsugaru and Soya Straits, respectively
- East Korea Warm and Yellow Sea Currents are western extensions of the Tsushima Current



East Korea Current

- Diverges from the Tsushima Current upon entering the Sea of Japan
- It flows north along the Korean coast as far north as Yongil Bay, turning southeast to rejoin the Tsushima Current near 39 N



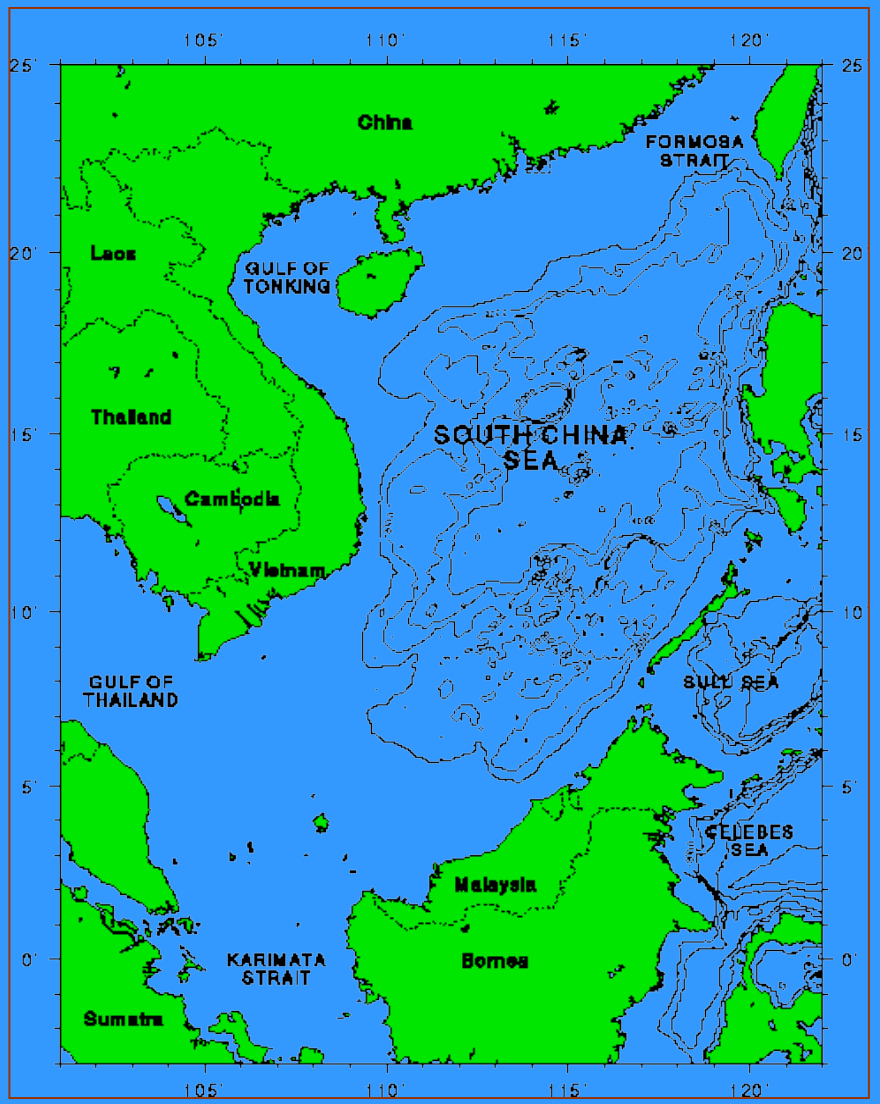
China Coastal Current

- Completing the gyre of the Yellow Sea is the China Coastal Current (C) which flows south along the coast

- Present year round, the current strengthens during the winter as it accelerates due to strong, persistent Northeast Monsoon

South China Sea Currents

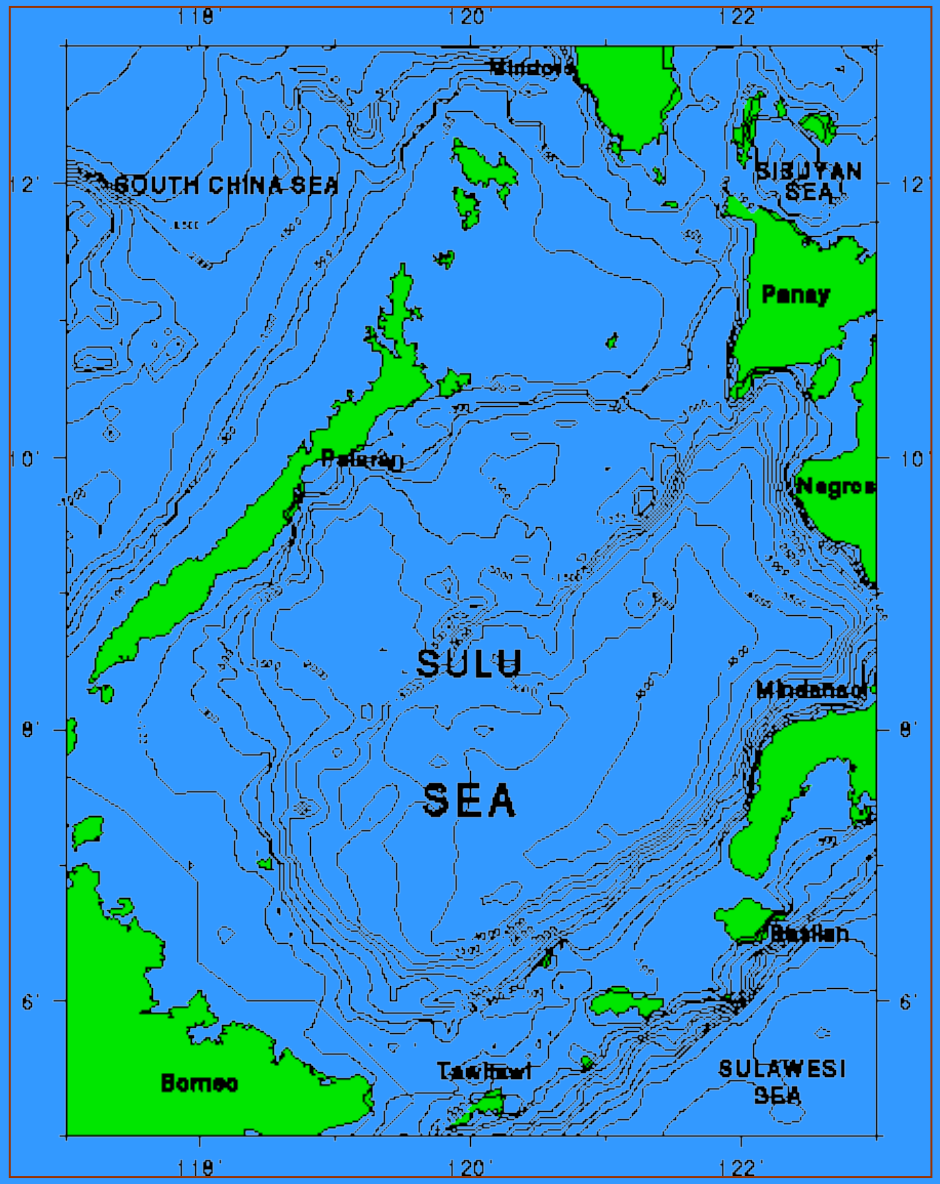
- Monsoon winds control the surface currents flowing into the South China Sea
- In winter, due to northeast surface wind through the Taiwan Straits and Bashi Channel and from the east through the Balabac Strait currents flow south
- During summer, the surface flow will reverse with currents setting northeast



Sulu Sea Currents

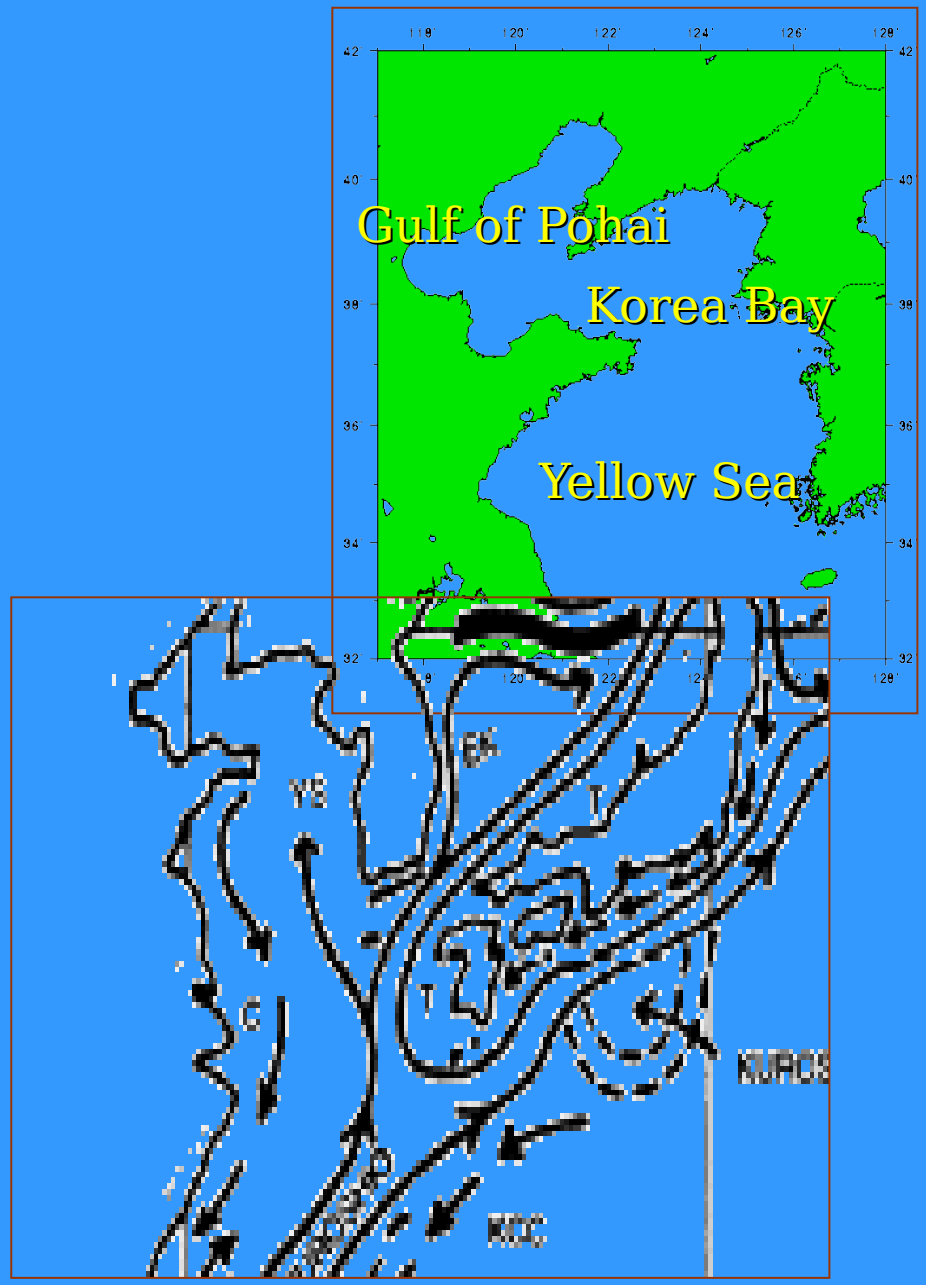
- During summer, surface currents in the Sulu Sea are generally from the south at rates up to 1.5 kts

- In winter, a counterclockwise current system exists in the sea



Yellow Sea Current

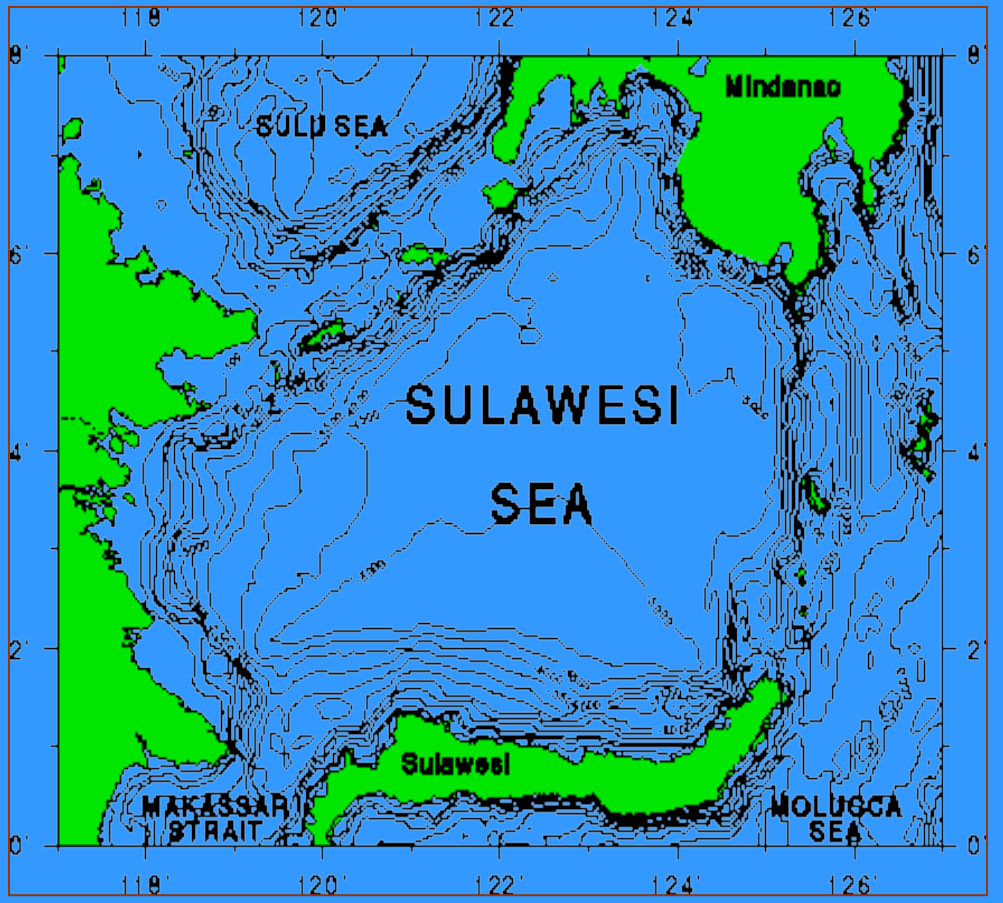
- Branches from the Tsushima Current near western Kyushu and flows north into the middle of the Yellow Sea
- Speed of current is less than 0.5 kts
- Develops in spring and summer and decays in the fall and winter



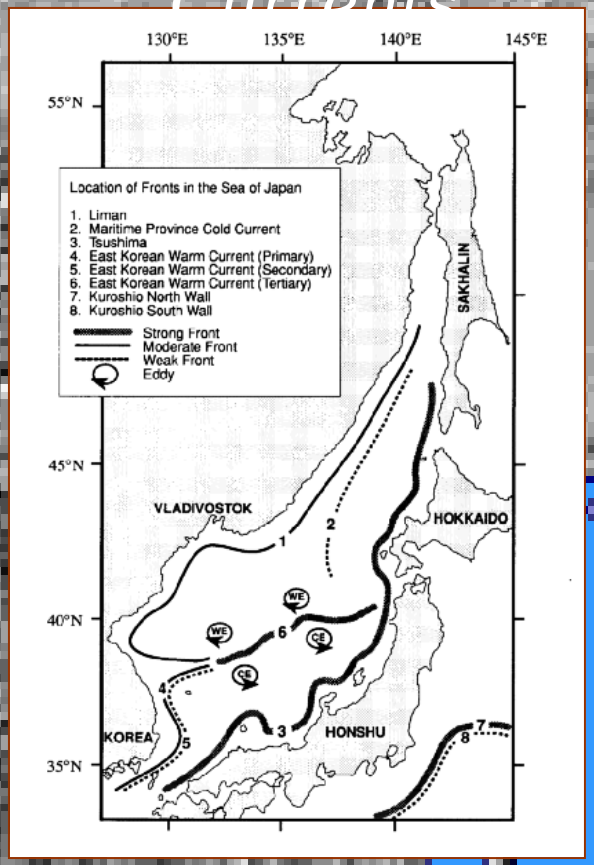
Sulawesi (Celebes) Sea Currents

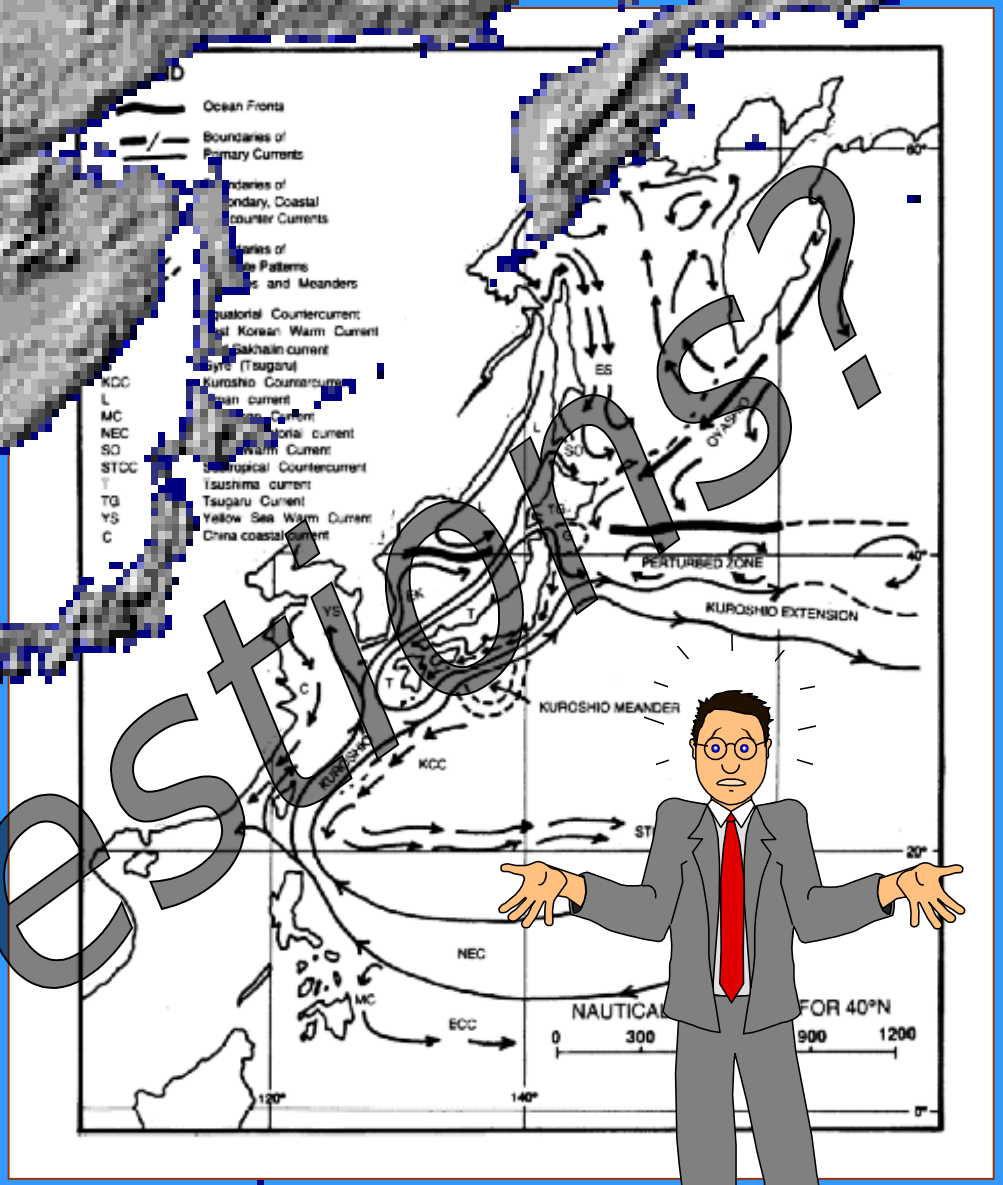
- Surface currents, during the summer, are mainly directed from Mindanao toward the Makassar Strait

- In winter, the south and southwest current systems are maintained for the larger part of the sea



Pacific Ocean Currents





Questions?